

H. W. Luder,

2. Sheets. Sheet. 1.

Sectional Boiler.

No. 94,226.

Patented Aug 31, 1869.

Fig. 5.

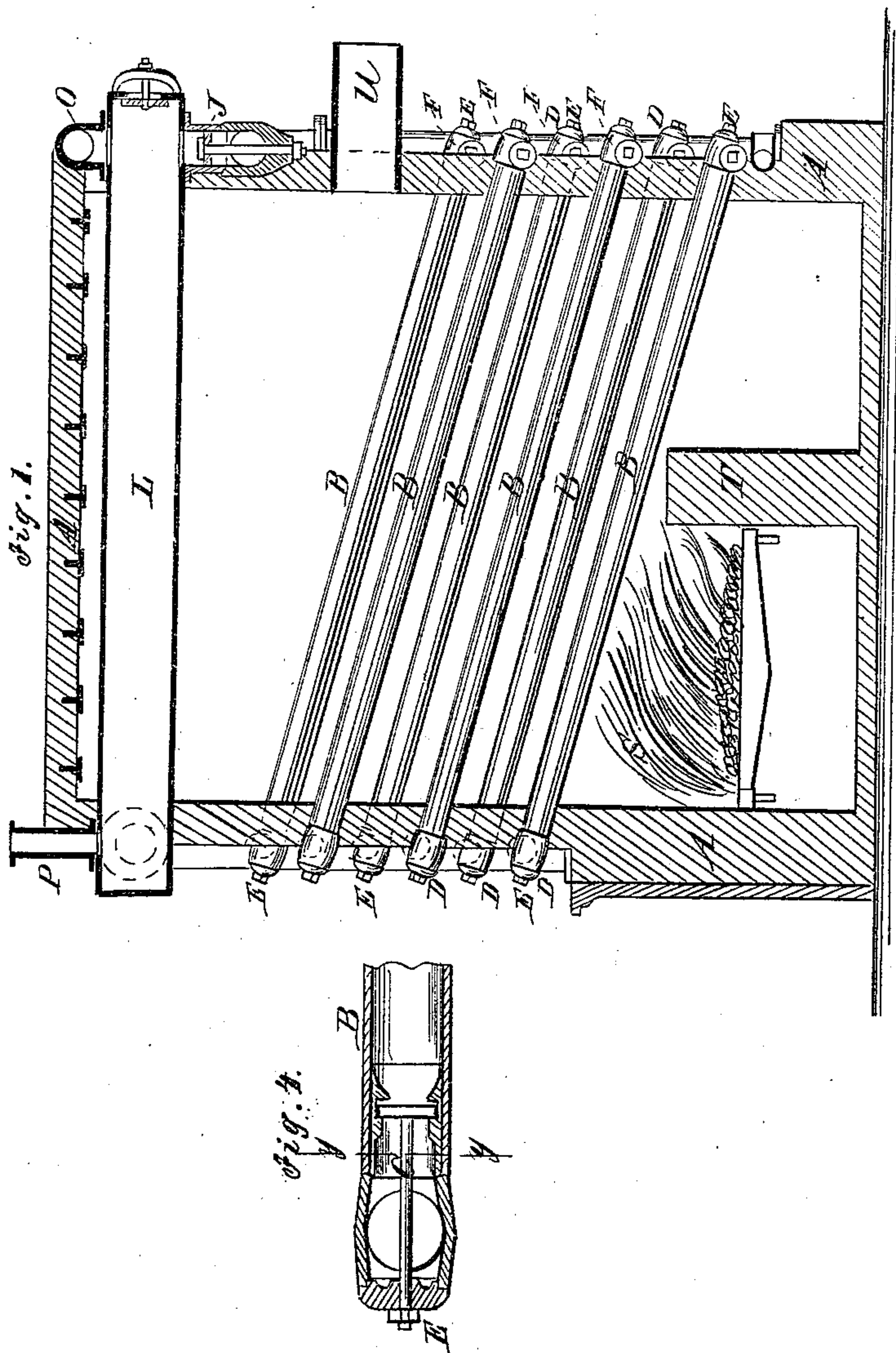
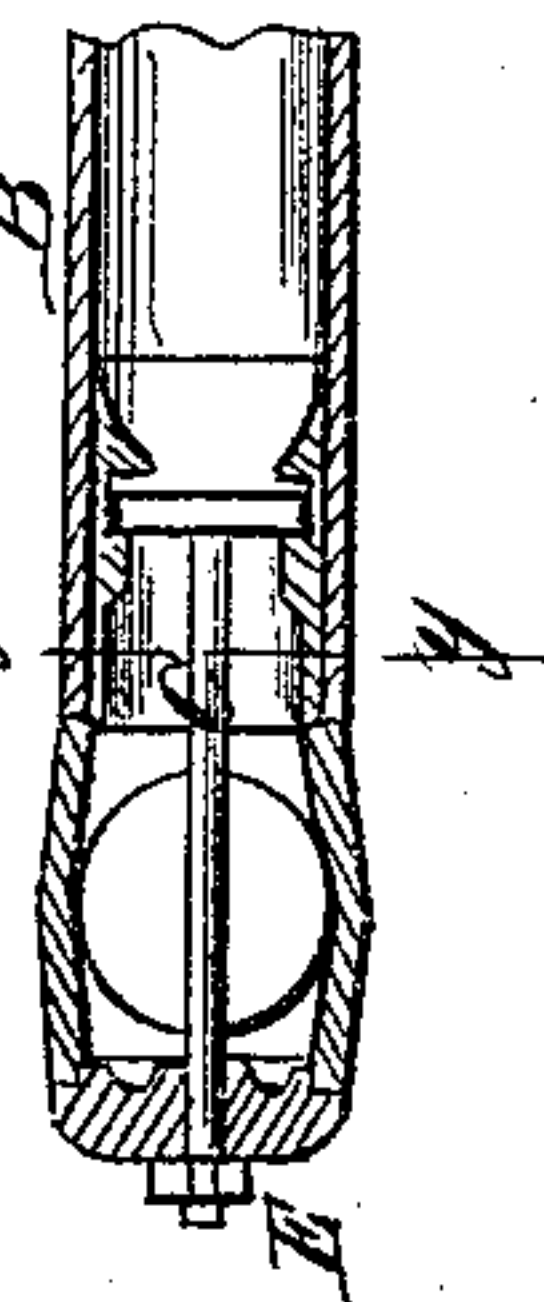


Fig. 4.



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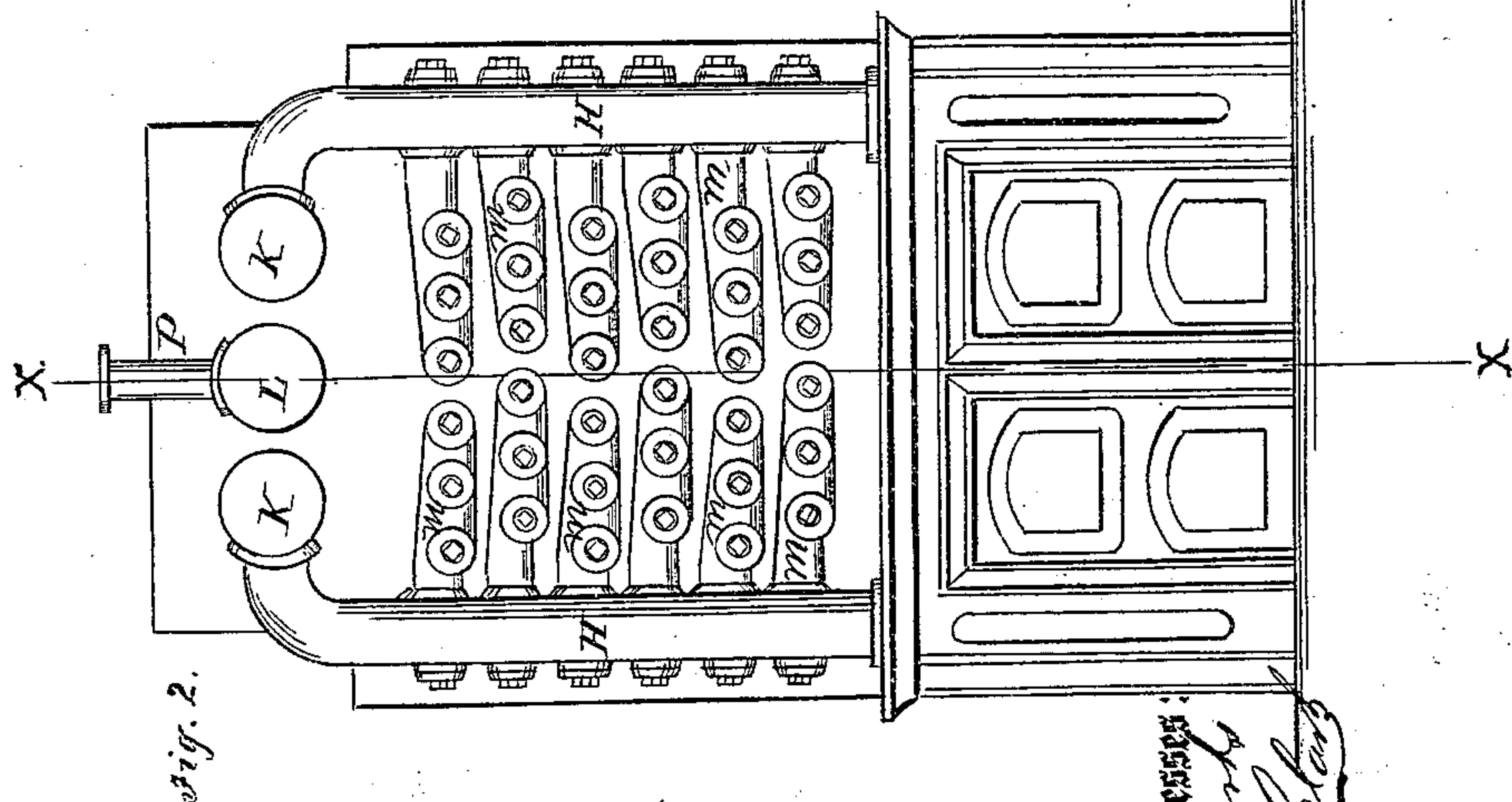
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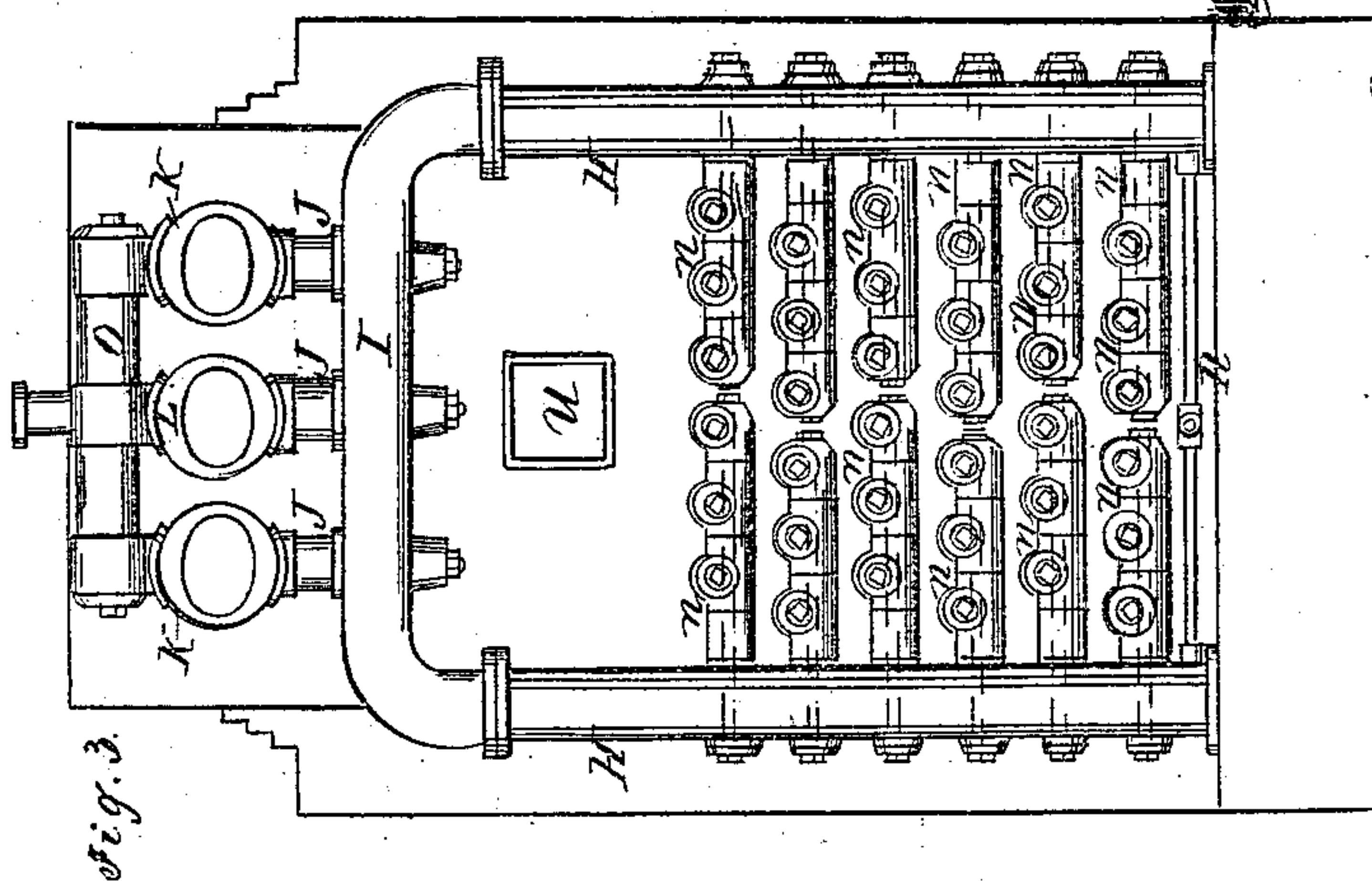
Sectional Boiler.

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HERMAN W. LÜDERS, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 94,226, dated August 31, 1869.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, HERMAN W. LÜDERS, of the city of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

This invention relates to new and important improvements in steam-generators, and consists of a series of tubes, made of any suitable metal, length, and diameter, and set longitudinally at any desired angle or inclination in an ordinary brick or mason-work furnace. The ends of these tubes are connected with horizontal tubes in a novel manner, and provision is made for the expansion and contraction of the metal.

The invention further consists in the construction, arrangement, and combination of parts as hereinafter more fully described.

In the accompanying plates of drawing—

Figure 1 represents a vertical longitudinal section of the boiler, through the line *xx* of fig. 2, showing the position of the generating-tubes, the furnace, and the central steam-chamber.

Figure 2 is a front-end elevation.

Figure 3 is a rear-end elevation.

Figure 4 is a detailed view, showing the method of connecting the inclined tubes at their ends.

Figure 5 is a cross-section of fig. 4 through the line *y-y*.

Similar letters of reference indicate corresponding parts.

A represents the "arch" or wall, by which the generating-tubes, steam-drums, and furnace are enclosed.

B represents the generating tubes.

As indicated in figs. 2 and 3, the boiler is made in two upright sections, each system of inclined tubes being connected at each end by the T-bolt C, as illustrated in figs. 4 and 5.

It will be seen that the heads of the T-bolts are held by lugs or shoulders in the tubes, and pass through caps D, so that those tubes are drawn by nuts E to the short sections of tubes F, which are cast on and form a portion of the horizontal tubes G, represented in figs. 2 and 3.

H represents vertical pillar-tubes, with which the horizontal tubes are connected.

These vertical tubes extend up from the lower tier of generating or inclined tubes, and connect at the front end of the boiler directly with the two outer steam-drums, by curving the ends inward, as seen in the drawing.

At the rear end of the boiler, these vertical tubes H, (one of which is placed at each corner,) are con-

nected by a cross-tube, I, which supports the tubular stands J, which form the connection with the steam-drums.

K represents the two outside drums, and L, the middle drum.

M represents the front transverse tubes.

These, it will be noticed, are of a peculiar formation. While their lower sides are horizontal, for receiving their respective tiers of generating-tubes, their upper sides incline upward toward the vertical corner tubes H, so as to allow of a free discharge of steam from the generating-tubes.

N represents the rear transverse tubes, which rest in a horizontal position.

These tubes are cast in longitudinal sections, which are connected by ball-and-socket joints, secured together by bolts, which run through the sections from the centre, and through the vertical tubes H, on which they are fastened by screw-nuts, as seen in the drawing.

The steam will be discharged from the elevated ends of the generating-tubes into the transverse tubes *m*; from thence into the front upright pillar-tubes H, and from thence into the two outside steam-drums K.

At the rear end of these drums it will be seen that they are connected with the middle drum L by the transverse pipe O, and the steam finds its way into the drum L, through this pipe O.

This cross-pipe O is so elevated that the water, which is carried up with the steam into the two outside drums K, will descend into the vertical tubes, and find its proper level in the boiler, thus producing a circulation in the boiler.

The steam, after entering the drum L, is discharged for use from the pipe P, at the front end of the boiler, and on its return through the central drum, it is thoroughly dried and prepared for use.

The water is introduced into the vertical tubes H, at the back end of the boiler, through the cross-pipe R.

S represents the furnace or fire-box.

T is the bridge-wall.

The smoke and unconsumed products of combustion pass from the boiler through the aperture U at the rear end.

By making the rear horizontal tubes in sections, and connecting them by ball-and-socket joints, the rigidity usually so ruinous to tubular boilers is avoided, expansion and contraction being thereby provided for.

It will be seen that the generating-tubes are so connected with the horizontal tubes that any one of them may be removed for repairs or exchange without disturbing the others; that a thorough and active water-circulation is kept up through the generating-tubes and the outside drums.

The generating-tubes may be readily exchanged as

regards their positions in the boiler. They may be turned over, or changed end for end, so as to present new surface to the more intense heat.

And the boiler, as regards its general features, is so constructed as to best secure any especial required service, all the advantages of a sectional boiler being secured by this arrangement.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The inclined generating-tubes B, the vertical pillar-tubes H, the transverse tubes *m* and *n*, and the drums K K and L, combined and arranged substantially as herein shown and described.

2. The arrangement of the steam-generating tubes, whereby any one may be removed, exchanged for another, turned over, or changed end for end, substantially as described.

3. In combination with a tubular boiler, the end tubes *m*, with inclined upper surfaces, and the sectional end tubes *n*, connected by ball-and-socket joints, substantially as described.

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